Synchro Checklist (Signalized Systems)

Using the Add Link icon, draw a stick diagram of your intersection(s) orienting the roadway/intersections as close to north-south as feasible. Note that Synchro shows you the approximate distance and coordinate you are drawing at the bottom left hand corner of your screen.

Once the intersection is drawn, click on one of the links, right click on the mouse, click on properties and the link setting window will appear. Enter the roadway name and speed limit for this link in the window. You must do this for EACH link where there is a name and/or speed change. Note there is a distance for the link in the window. You can type in the link distance here, but this distance must be within 30% of the distance drawn or you will not be able to run your simulation. You can also click on the move node icon and adjust the nodes to get your links the proper distance.

Under Options at the top of the screen open Network Settings and follow the steps below to set up your diagram. Always press the SET ALL button after each input! In general, do not change any of the default values except the ones below.

1. **Lanes tab-uncheck the right turn on red box. Set lost time to 5 seconds for most intersections, and increase clearance as needed for large cross sections such as a single point urban interchange (SPUI). At the bottom of the palette, make sure the Entire Network box is checked under the Set All Scope**
2. Click on the Volumes tab and change the Heavy Vehicle percentages and Speed Limit to whatever is appropriate for your project. Double check the peak hour factor (PHF) and make sure it is 0.90.
3. Click on the Timings tab.
   - Cycle Length-set the cycle length to range from 60 to 180
   - Check the allow Lead/lag Optimization box
   - **Set the yellow time to 5 seconds**
   - **Set the red time to 2 seconds**
   - Minimum Split Thru-set to 17 secs (10 secs green plus 5 secs yellow plus 2 secs all red)
   - Minimum Split Left-set to 14 secs (7 secs green plus 5 secs yellow plus 2 secs all red)
   - Controller type-set to pretimed or actuated coordinated.
4. Click on the Phasing tab
   Minimum Initial-set to 7 secs
   Pedestrian Phase-Uncheck box

Click on the node you want to code information for first. Right click on the mouse and click on quick editor to enter the number of lanes for each direction. You can also click on the Lanes icon at the top of the screen to enter this information.

Click on the Lanes Window to enter a storage length for a particular lane. On the Lanes Window you can also double check to make sure that right turn on red reads “no”. If you are in an area that does not have flat terrain such as the mountains, you can enter the percent grade if that information is available. Also, unless you are in an urban area, leave the area

type as other (default). If you are in an urban area change the area type to CBD (Central Business District).

Another way to enter the volumes by lane is on by clicking on the Volume Inputs icon and entering the appropriate volume for each movement. If the percent heavy vehicle varies by direction, you can enter the directional percentages here.

Click on the Timing Settings. If necessary, change any left turn movements from perm (permitted) to prot (protected) as determined by the left turn treatment formula (see Appendix in the Plan Review Squad Training Manual). If you have a coordinated signal system, change your reference phase to match the directional flow of traffic that you want coordinated (usually 2+6). If you are running a signalized system and can determine which intersection is the controlling intersection, check that intersection for the master intersection.

Click on Optimize and Network Cycle Lengths. Set up your minimum cycle length to whatever is appropriate for this system (refer to the minimum cycle length criteria table). For instance, if you have three intersections, 2-2 phase and 1-3 phase intersections, the minimum cycle length will be 90secs. Once your minimum cycle length is in the neighborhood of 120 plus/minus seconds, it is possible to check the half cycle length box so the 2 phase intersections could run at a 60 second cycle length or more, etc. Make sure extensive is shown for offset optimization. Then click on automatic.

Click on Optimize at the top of your screen and then Network Offsets. Make sure that optimize, optimize lead/lag (the gauge should be in the middle) and entire network are marked and hit OK.

At this point, you have probably gotten the best level of service you can get without making adding some additional lanes to your intersection(s).

Either under Options--Scenario Manager and/or under File—Create Report-header:footer -- Options enter the TIP number, design year and the peak hour for the volumes used for your capacity analysis. This information will be useful for anyone looking at your files in the future. Using your mouse, drag a box over all the intersection nodes that you would like to have a report created for if you want a report for the system.

SimTraffic

Once you have your Synchro file set up and saved, hit the SimTraffic animation button to simulate how your traffic will flow on your project. If you get a fatal error message, the simulation will not run and you will need to modify your Synchro file before the simulation will work. When running SimTraffic, you should always simulate the traffic for a one hour time period. Under Options go to Intervals and Volumes, click on the intervals block and insert twice and change the minutes to 15 per each interval. You can also change the start time here if you want.
** After running your simulation if you decide to make any lane configuration or other changes, you must go back to Synchro, make the changes and reoptimize, etc., your network.

Once you have your system running properly, hit Record Simulation Icon so you don't have to continue to seed the network each time you want to watch the simulation.

Miscellaneous

You can model stop-controlled intersections on Synchro if you have traffic forecasts for the intersection. Enter your volumes as above, but go to the Phases tab and change the controller to unsignalized. **You will have to run unsignalized intersections in another software program such as HiCAP 2000 or Highway Capacity Software (HCS 2000) to obtain a LOS for an unsignalized intersection.**

Occasionally it is necessary to install "dummy" nodes in your simulation. If you have interchange loops or free flow right turn lanes or are working with a single point urban interchange (SPUI), you will probably need to install "dummy" nodes. In order to install "dummy" nodes, you will need to add a link, change the nodes to unsignalized at both ends of the link and change the movement to free flow, yield or stop-controlled (Synchro initially assumes all movements are stop-controlled). You will have to enter the directional volumes at each new node.

Lane drops can be modeled in synchro. Add a "dummy" node in the area of the lane drop/addition by deleting the link and leaving the node. Click on the link you want to add/drop the lane, hit properties and change the travel lanes to the appropriate number. Move the node and adjust the link distance as necessary.